

4.1. Systems of linear Equations in 2 variables

Tuesday, September 19, 2017 8:29 AM

Goals : ① Solve system of linear equations by the method of substitution.

② Solve systems of linear equations by the method of elimination

③ Solve systems of linear equations by the method of using the graphing calculator.

④ Solve application problems

Method of Substitution

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$$\begin{cases} 3x + 5y = -9 \\ x + 4y = -10. \end{cases}$$

Solve this system.

Key: Pick an equation. Solve for one variable in terms of the other. Substitute the expression you got for that variable to the remaining equation. This turns that equation into an equation in one variable. Done!

$$x + 4y = -10 \rightarrow x = -4y - 10$$

Substitute this into the first equation:

$$3(-4y - 10) + 5y = -9$$

$$-12y - 30 + 5y = -9$$

$$-7y = 21$$

$$y = -3$$

$$x = -4 \cdot (-3) - 10 = 2$$

Solution: $(2, -3)$.

Method of Elimination

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$$\begin{cases} 3x + 5y = -9 \\ x + 4y = -10 \end{cases}$$

Key: Multiply either one or both equations by some number and add them so that one variable disappears.

Eliminate x :

Multiply the second equation by -3

Add		$3x + 5y = -9$
		$-3x - 12y = 30$
		<hr/>
		$-7y = 21 \rightarrow y = -3$

$$x + 4(-3) = -10$$

$$x - 12 = -10 ; x = 2$$

Solution: $(2, -3)$

Eliminate y :

Multiply first equation by 4

Multiply second equation by -5

Add them

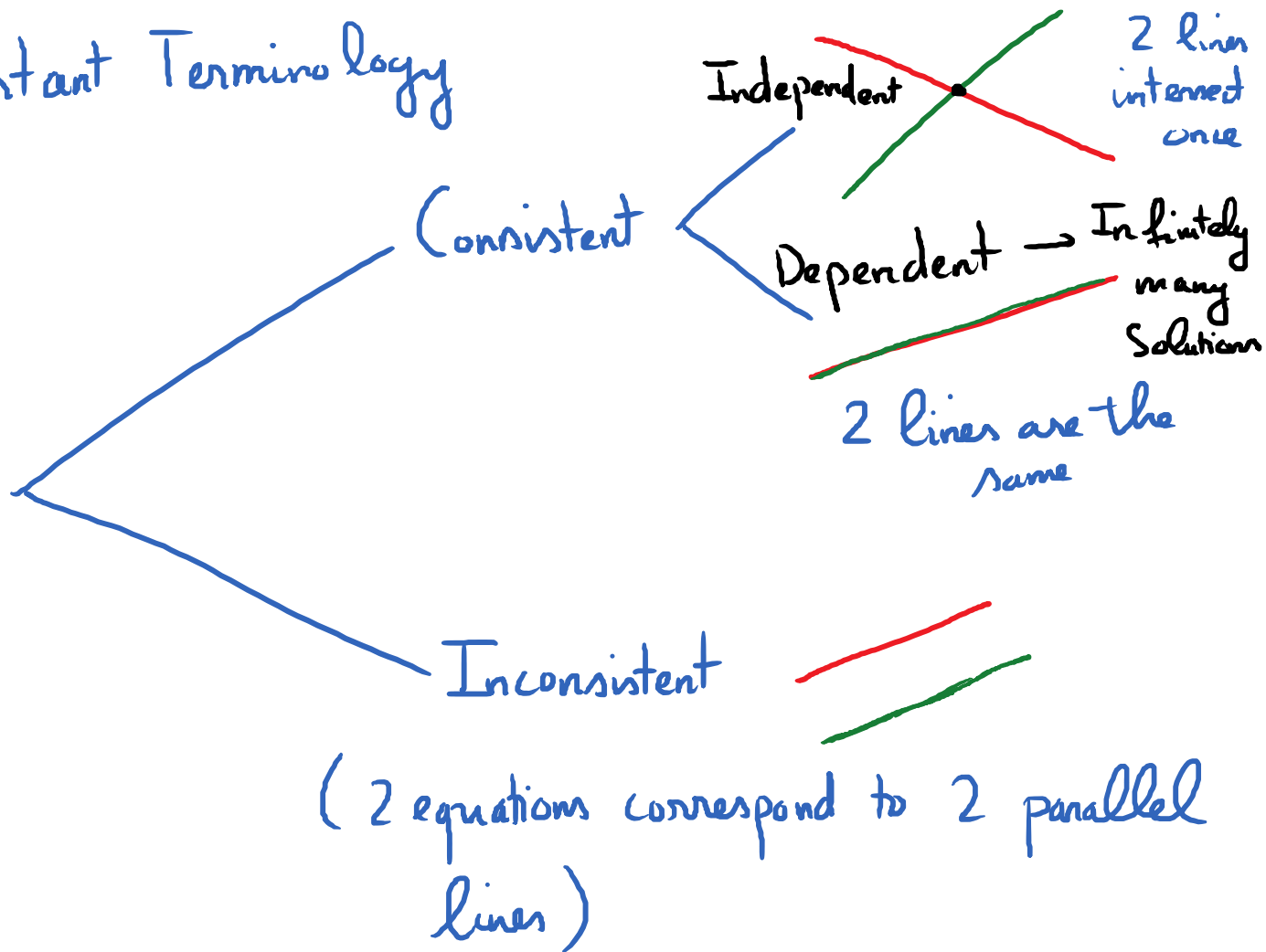
$$\begin{cases} 3x + 5y = -9 \\ x + 4y = -10 \end{cases} \rightarrow \begin{cases} 12x + 20y = -36 \\ -5x - 20y = 50 \end{cases} \xrightarrow{\text{Add}} \begin{array}{l} 7x = 14 \rightarrow x = 2 \end{array}$$

$$2 + 4y = -10 ; 4y = -12 ; y = -3$$

* Solve by using TI calculators

$$\text{Solve } \begin{cases} -x + y = 3 \\ 2x + y = -3 \end{cases} \rightarrow \begin{cases} y = x + 3 \\ y = -2x - 3 \end{cases}$$

Important Terminology



Applications

Supply / Demand

Linear Supply Curve: From the supplier perspective